Scratch-built Rutan Quickie model airplane *Yellowfin*

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This article documents the construction of a radio-control model of Burt Rutan's "Quickie," from plans by Werner Schaefer in the magazine *Flugmodell und Technik* (www.vth.de/fmt), January 2005, page 80.

Within two weeks of the plans' publication, I'd bought 3 mm Depron foam sheet, carbon rods and some electric motors. A month later I'd finished testing the motors with various propellers on a static thrust stand to measure current and thrust, whereupon I chose the best combination.

Five years then passed while I built and flew other airplanes. Once I'd started building, within a month all the foam had been cut and the fuselage was almost complete.

Four years later, another two months of similarly sporadic work finished the wing and canard, rendering it flyable.

Five *more* years inexplicably passed until its livery was ready to photograph before its first flight.

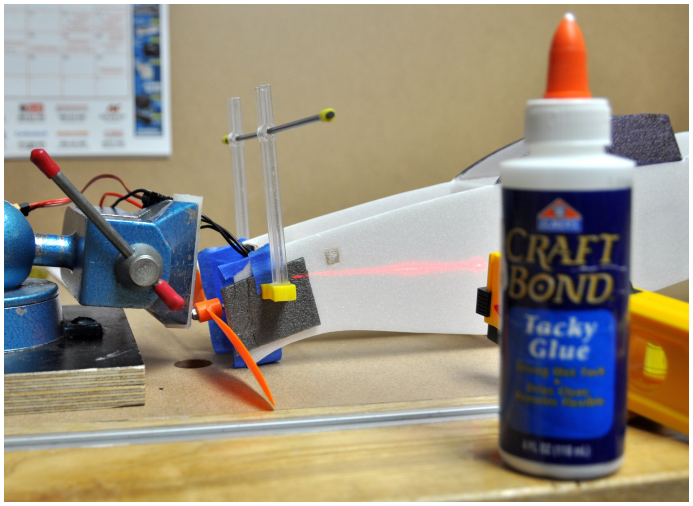
Although it has the dimensions of an indoor flier, I fly it outdoors in winds less than 5 mph, to not worry about colliding with walls or ceiling.

The airplane spans 815 mm (32 inches). It weighs 226 g (8 oz), including a 46 g 830 mAh 2-cell Li-poly battery.

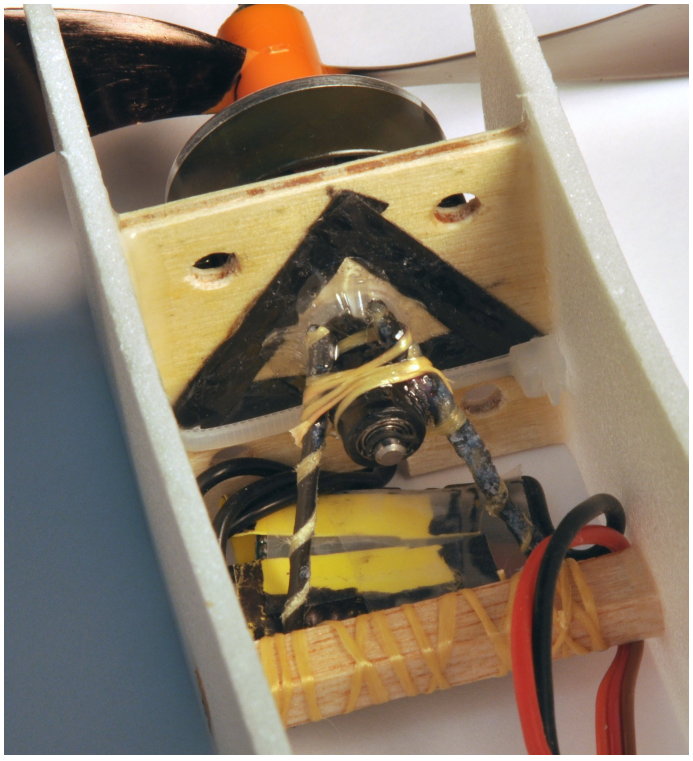
Its wing and canard total 255 in^2. Including the canard, its wing loading is 4.5 oz/ft^2, and its cubic wing loading is 3.4 oz/ft^3, typical for a so-called backyard flier.

The battery powers an Electrifly SS-8 ESC, which drives a "single speed stator" rewound CD-ROM motor from www.customcdr.com, spinning a GWS 8×4.3 inch propeller.

At full throttle it has about 200 g of thrust and draws 7 A, yielding flight durations of 7 to 10 minutes.

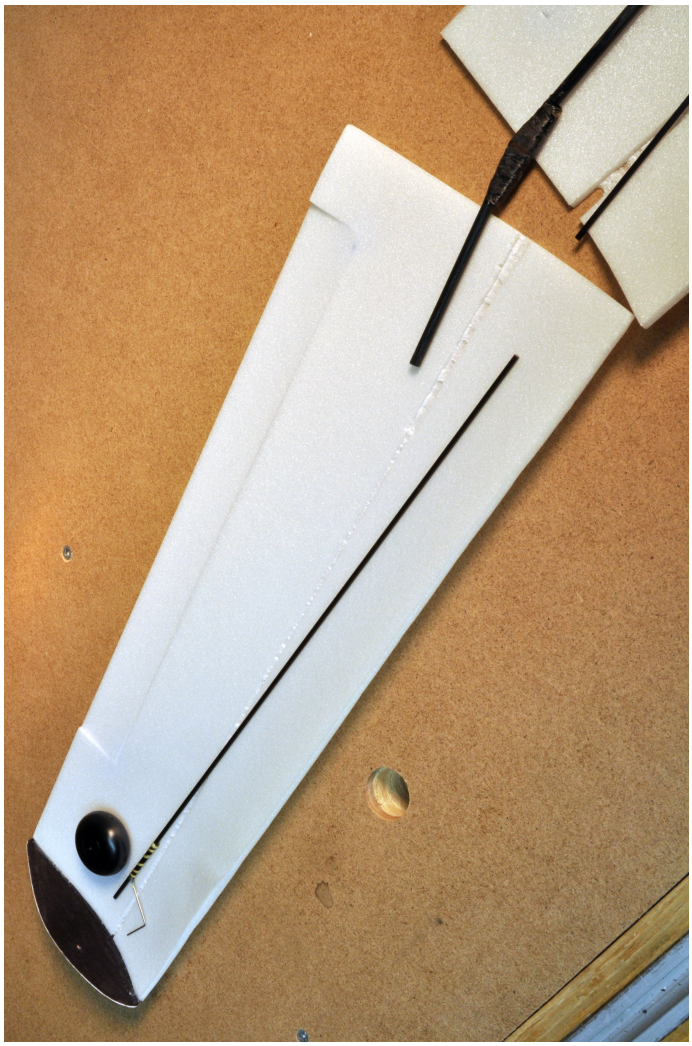


1. While gluing the firewall to the fuselage, a laser level helped aim the motor's thrust line through the center of gravity marked on the plans. Low-tack painter's tape, foam scraps, and lightweight clamps secured everything while the Elmer's "Tacky Glue" set. This thick, flexible adhesive worked well on this airframe's foam, wood, and carbon.



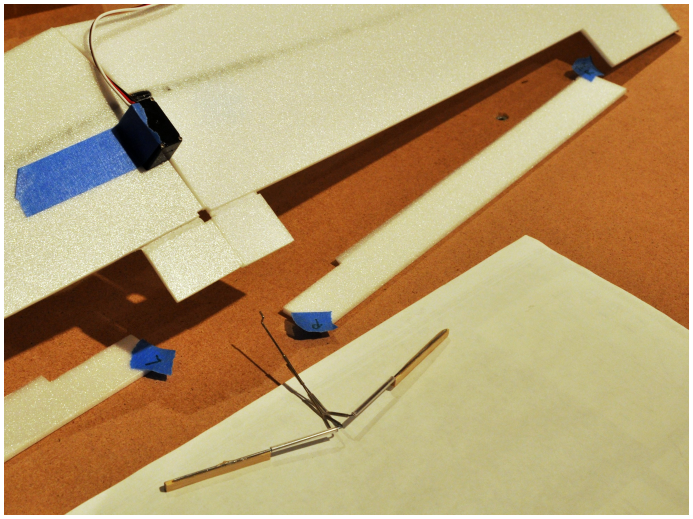
2. The "rewound CD-ROM" motor is a brushless outrunner that was popular from 2003 to 2007, before mass production. Such motors from CD-ROM drives would have their magnets and wiring replaced by hand to suit an airplane's speed and torque.
In hindsight, the firewall's extra carbon struts and Kevlar thread are overly strong: in a crash, the plywood firewall would more likely tear out of the foam than crack internally.

3. While gluing the canopy's rounded top to its sides, odds and ends provided just enough clamping weight without denting the foam.

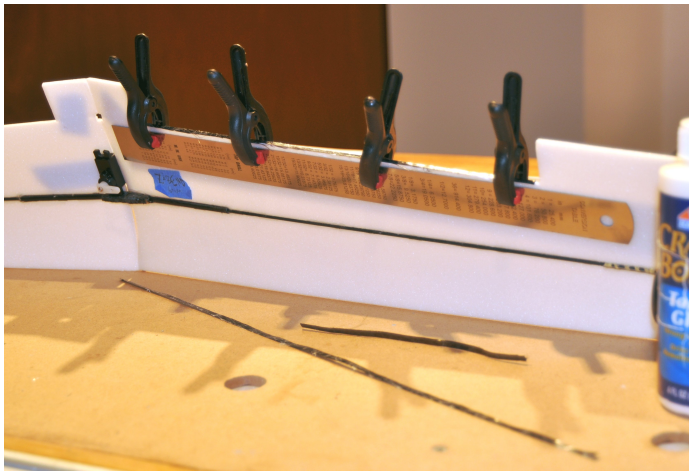


4. Axles made from bent paper clips were lashed onto the cambered canard's carbon spars. The wheel pants were cut from 1/64 inch plywood. The dihedral joiner was two carbon tubes capturing the spars, lashed together with carbon tow over a tapered balsa block.

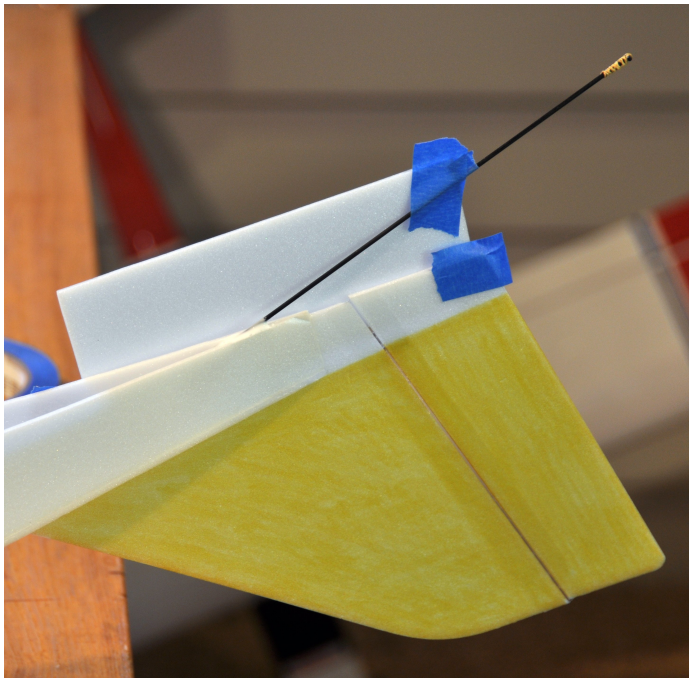
5. The elevator's linkage used heat-shrink tubing to join the left and right torque tubes, and to hinge the servo's pushrod to the torque tubes.



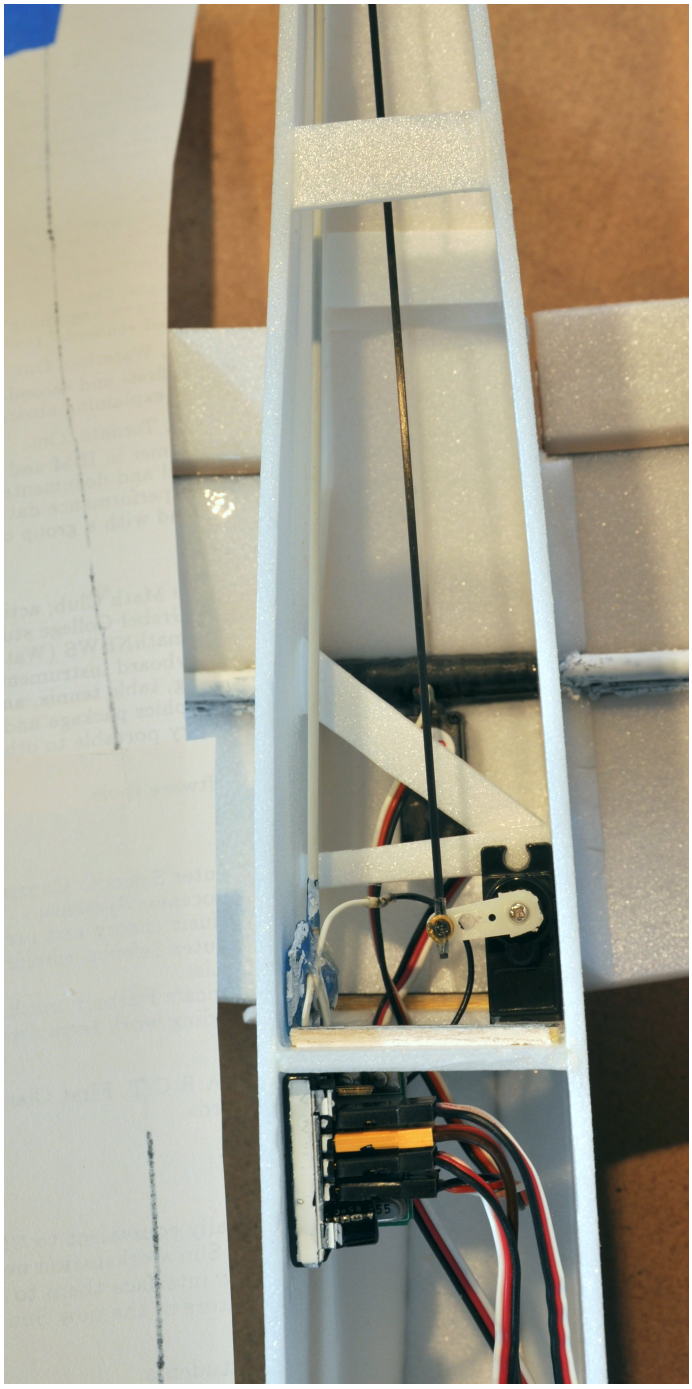
6. The torque tubes were bonded with cyanoacrylate to balsa hardpoints, to spread the load to each elevator half in the canard. (Here, the hinge is bent differently from the previous photo.)



7. To reduce bending along the long hinge of each elevator half (especially during the greater bending loads of a takeoff roll), carbon tow was glued to the hinge line's inner face, clamped straight between two steel rulers.

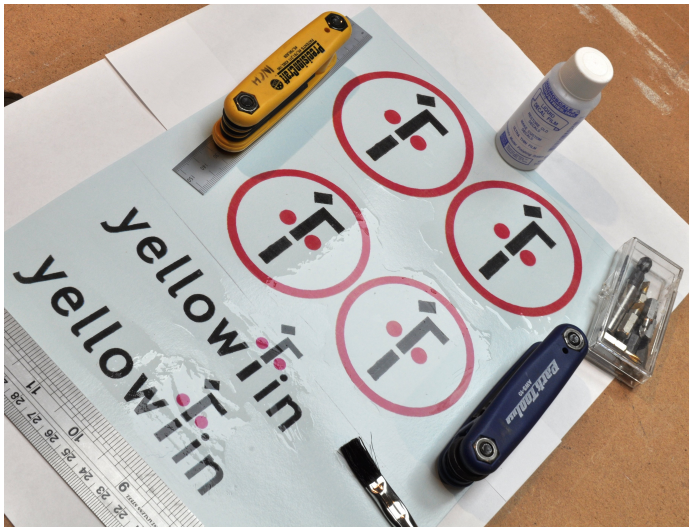


8. The carbon tailskid was taped to a foam scrap to hold it straight while its glue cured. The tailskid was tipped with a very short transverse piece of the same carbon rod, wrapped with Kevlar thread to resist abrasion.



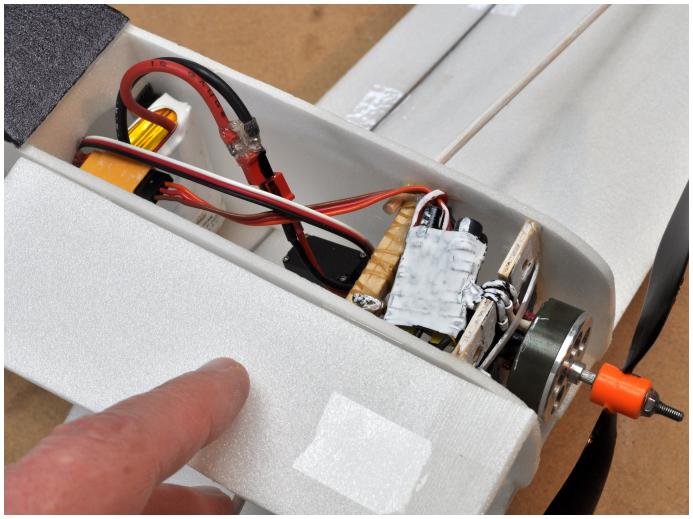
9. At left, a paper tracing of the fuselage's bottom served as a template for the floor, seen in the next photo.
The rudder servo's forces were spread with two foam struts. Behind that, the aileron servo braced against the spar of the main wing, for the same reason. Those servos, the FMA M5 72 MHz radio receiver, and the W.S. Deans base-loaded antenna were scavenged from airplanes that had been irrepairably crashed.
For disguise, the dihedral joiner was painted white outside the fuselage.
Foam fillets of triangular cross section joined the wing to the fuselage.

10. Because little clamping force was needed, low-tack masking tape could hold the floor while its glue set.
As with the elevators, the hinge line of each aileron was long enough to warrant carbon stiffeners.
Replacing the canard's nonscale bamboo struts with stiffer spars was too difficult, so they were just disguised with white paint.
Also, as the years went by, the glue bottle's label got redesigned.

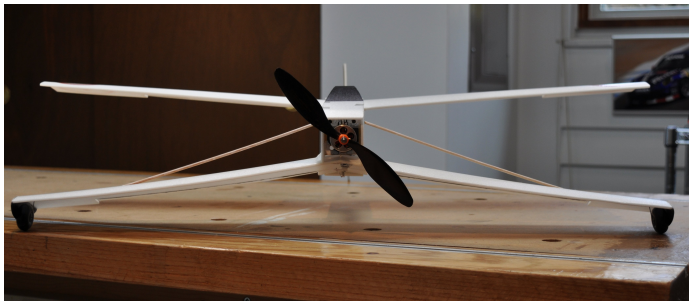


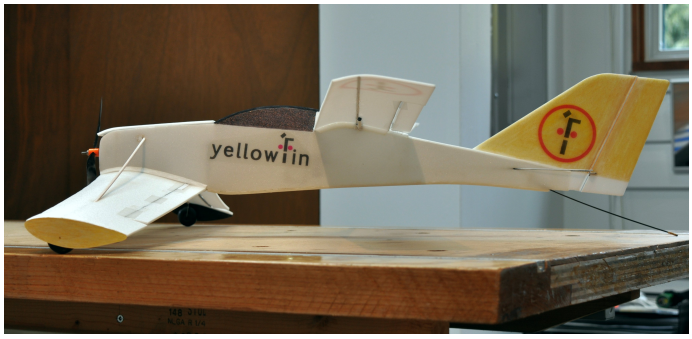
11. The livery honored a beloved family-run sushi restaurant in Champaign, Illinois. The designs were enlarged from a chopstick wrapper. Sadly, during the six years between the previous photo and this one, the owner had already retired and closed shop after a run from 2002 to 2017.
I laser-printed the designs onto Testor's 9201 water-slide decal paper. Microscale's liquids helped to apply the decals to the foam.

12. The airplane's odd shape made it tricky to hold the (yellow!) fin horizontal while applying its wet roundels. I had to let the wings straddle the corner of the workbench, and then gently hold down the airplane with a paperback.
Again for disguise, the aileron servo and its linkages were painted white.



13. The nose of the tape-hinged hatch was kerfed with a razor saw to better hold its downward curve. The ESC was painted white so its bright yellow case won't show through the thin foam. The propellor blades were blackened with a Sharpie marker to obscure their similarly distracting color.





14. A three-view of the airplane, finished at last on the tenth of March, 2019.